BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

(12) UK Patent Application (19) GB (11) 2 171 135 A

(43) Application published 20 Aug 1986

(21) Application No 8603840

(22) Date of filing 17 Feb 1986

(30) Priority data

(31)	(32)	(33)
8503928	15 Feb 1985	GB
8507922	27 Mar 1985	
8515776	21 Jun 1985	

(51) INT CL[4]
E06B 3/46

(52) Domestic classification (Edition H)
E1J EC
U1S 1212 E1J

(56) Documents cited
None

(58) Field of search
E1J
Selected US specifications from IPC sub-class E06B

(71) Applicant
Acmetrack Limited (United Kingdom),
Holland Road, Hurst Green, Oxted, Surrey RH8 9BP

(72) Inventors
Kenneth Jacobs,
Auguste Menard

(74) Agent and/or address for service
Graham Watt & Co., Riverhead, Sevenoaks, Kent
TN13 2BN

(54) Improvements in and relating to sliding doors

(57) A slider (41) for guiding the top of a sliding door (12) in a channel (42) comprises spaced cheeks (56) between which extends a rib (59) which engages one side of the channel, and a rib mounted on a flexible tongue (60) which flexes between the cheeks and is thereby biased into engagement with the other side of the channel. An alternative form of slider is shown (Fig. 10) wherein first and second members (113, 114) overhang the sides of the body, at least one of them being rotatable and having a deformable circumference.

A wheel assembly on the base of the door is height adjustable by virtue of an eccentric securing device.

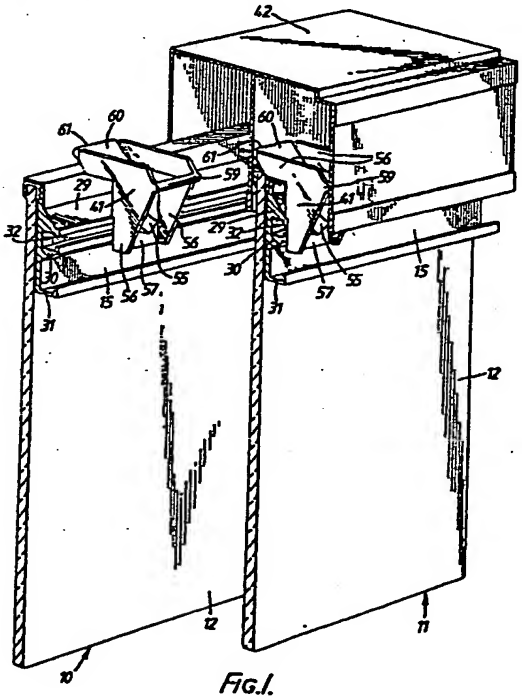

FIG.1.

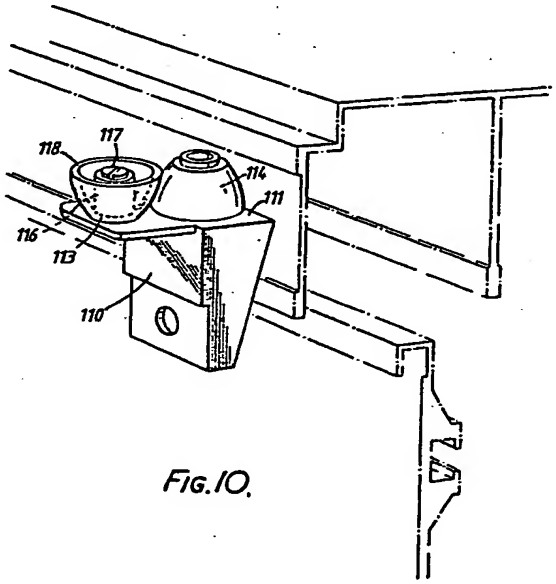

FIG.10.

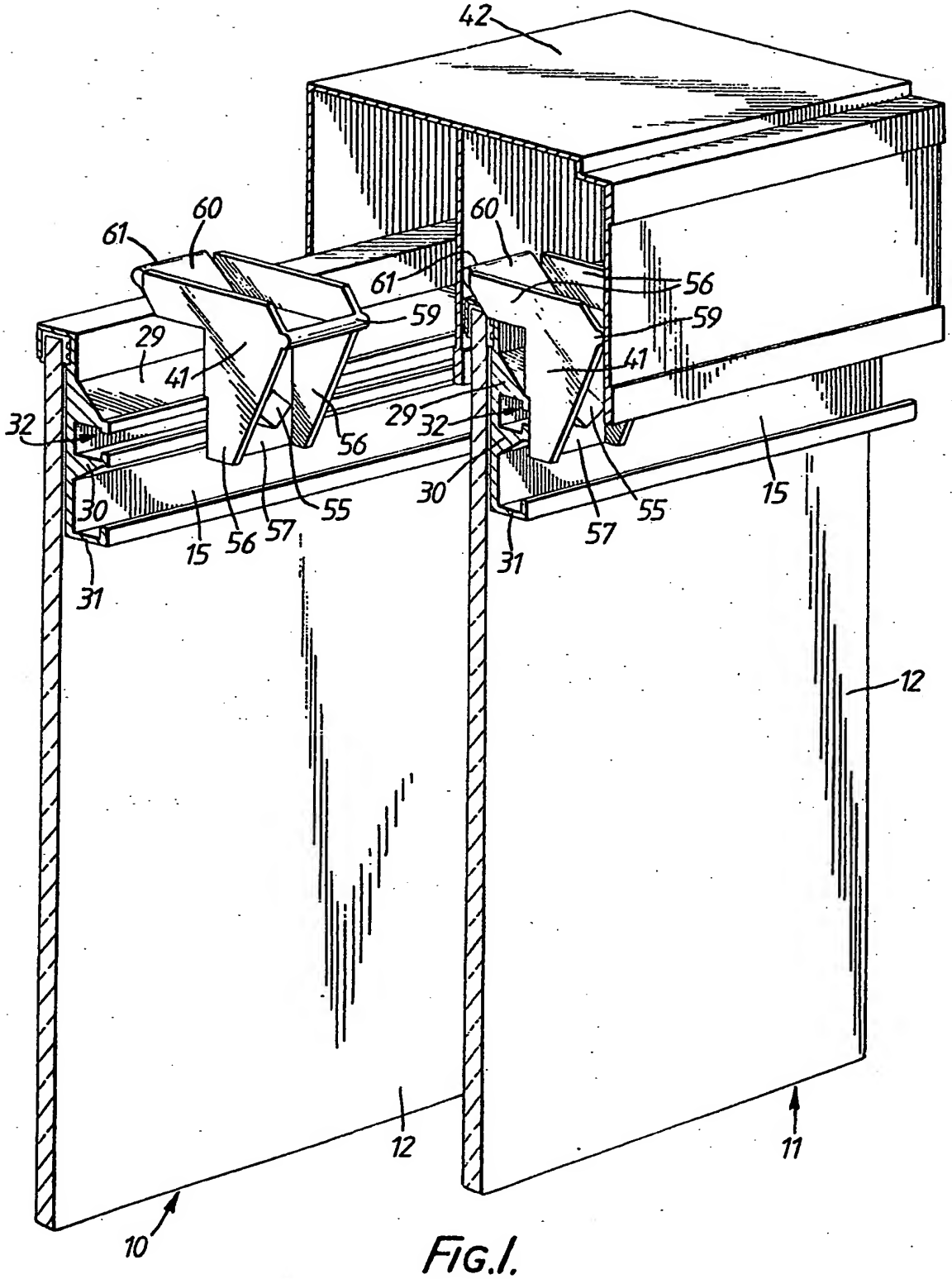
42
60
61
60
61
56
59
59
29
41
41
32
29
32
56
30
30
55
57
15
56
57
55
15
31
31
12
12
11
10

FIG.1.

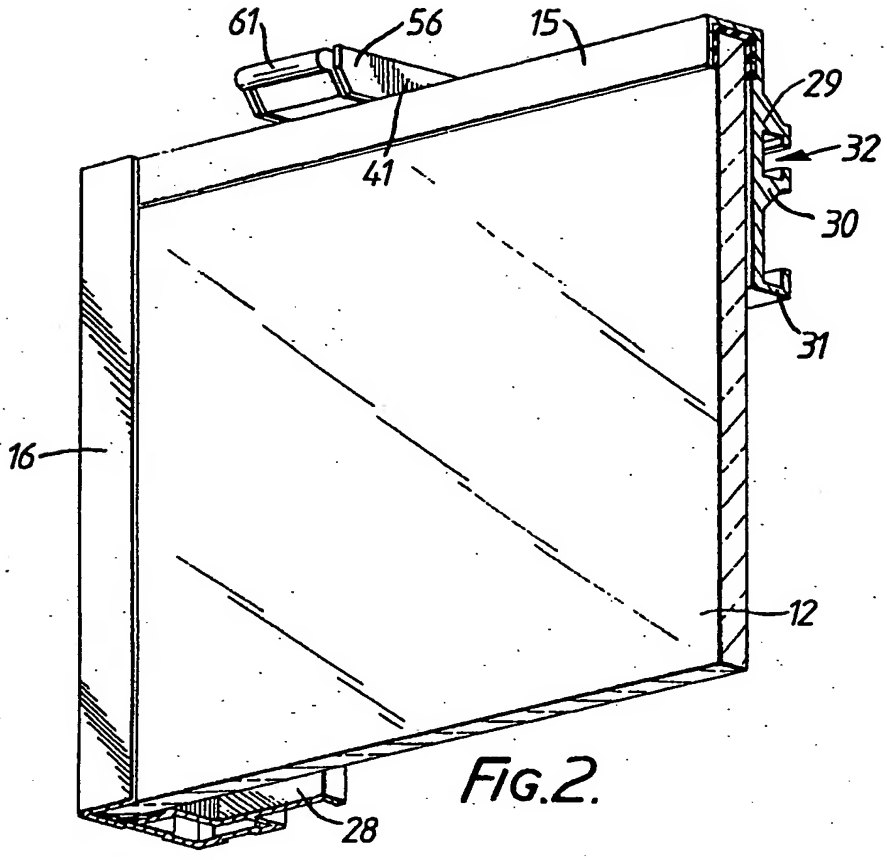
61
56
15
29
32
41
30
31
16
12
28

FIG.2.

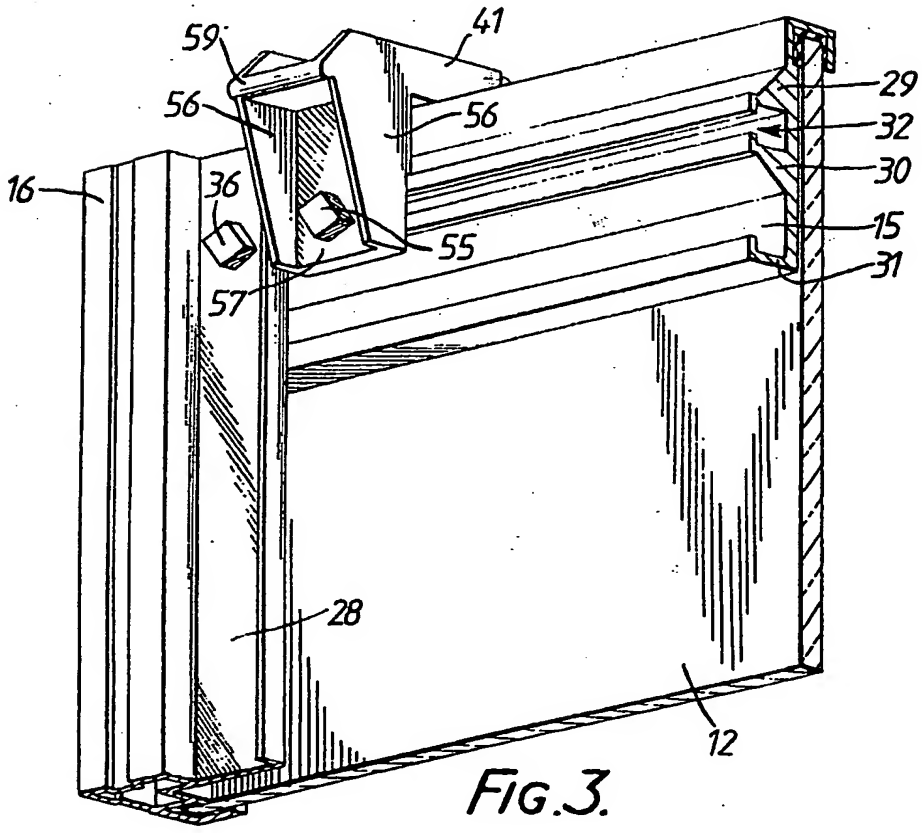
59
41
56
56
29
32
30
16
36
55
15
31
57
28
12

FIG.3.

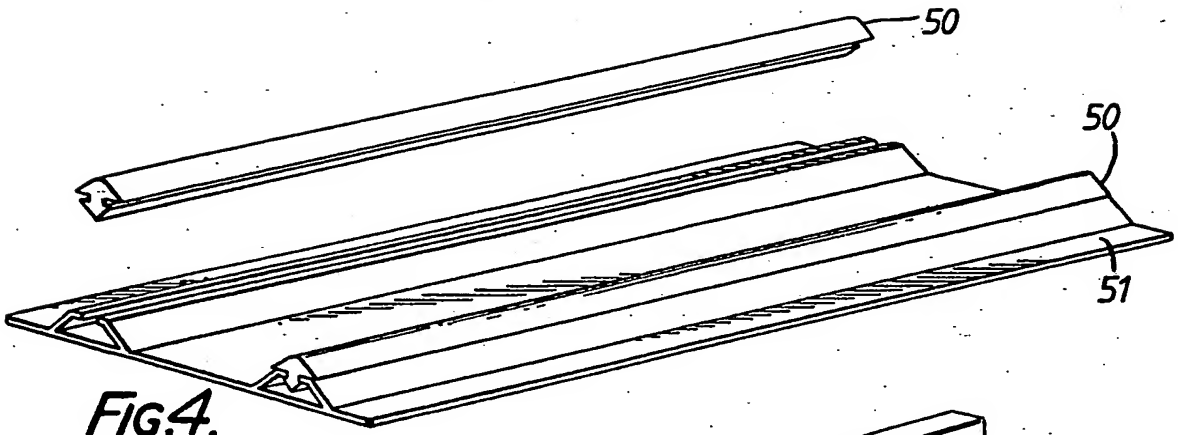

FIG.4.

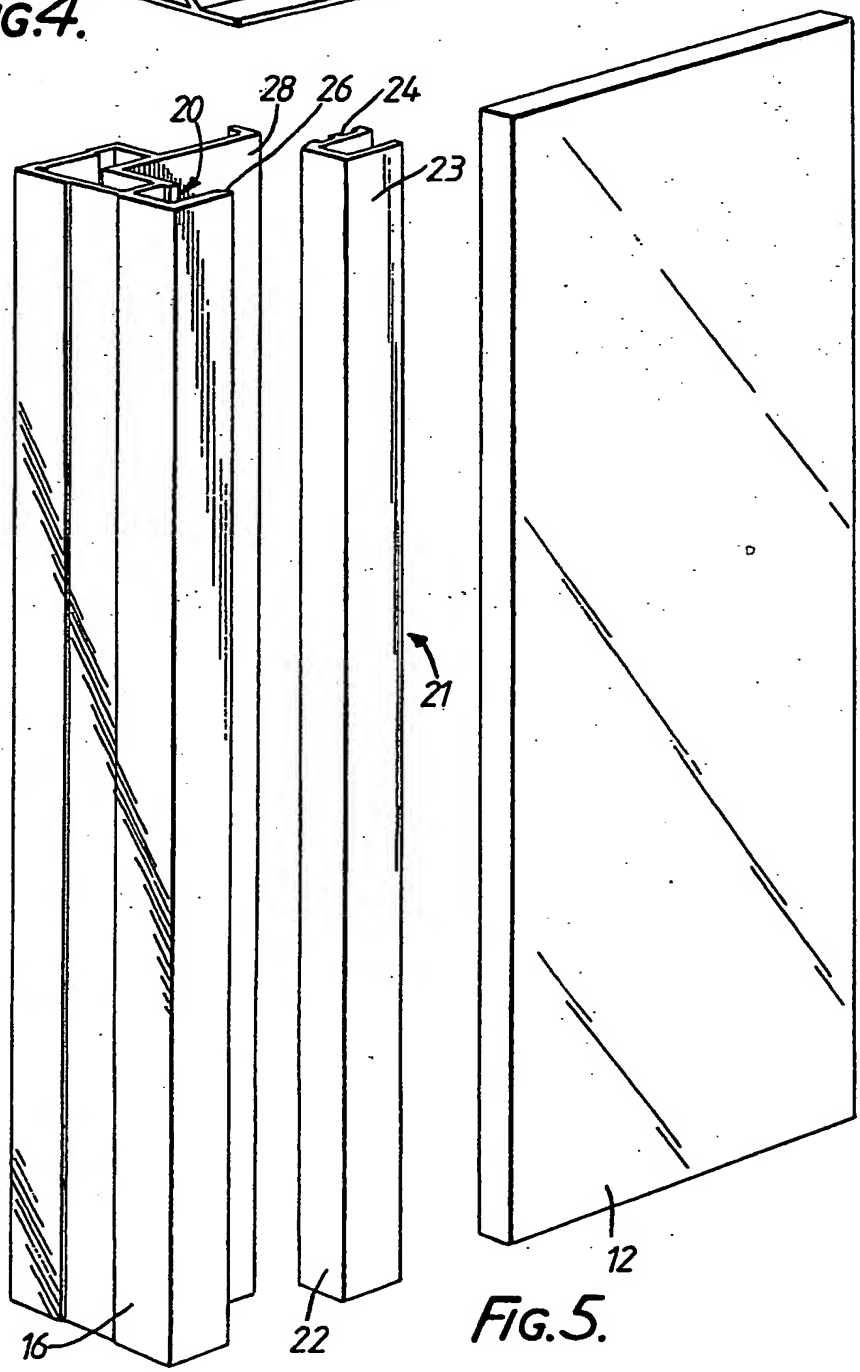

FIG.5.

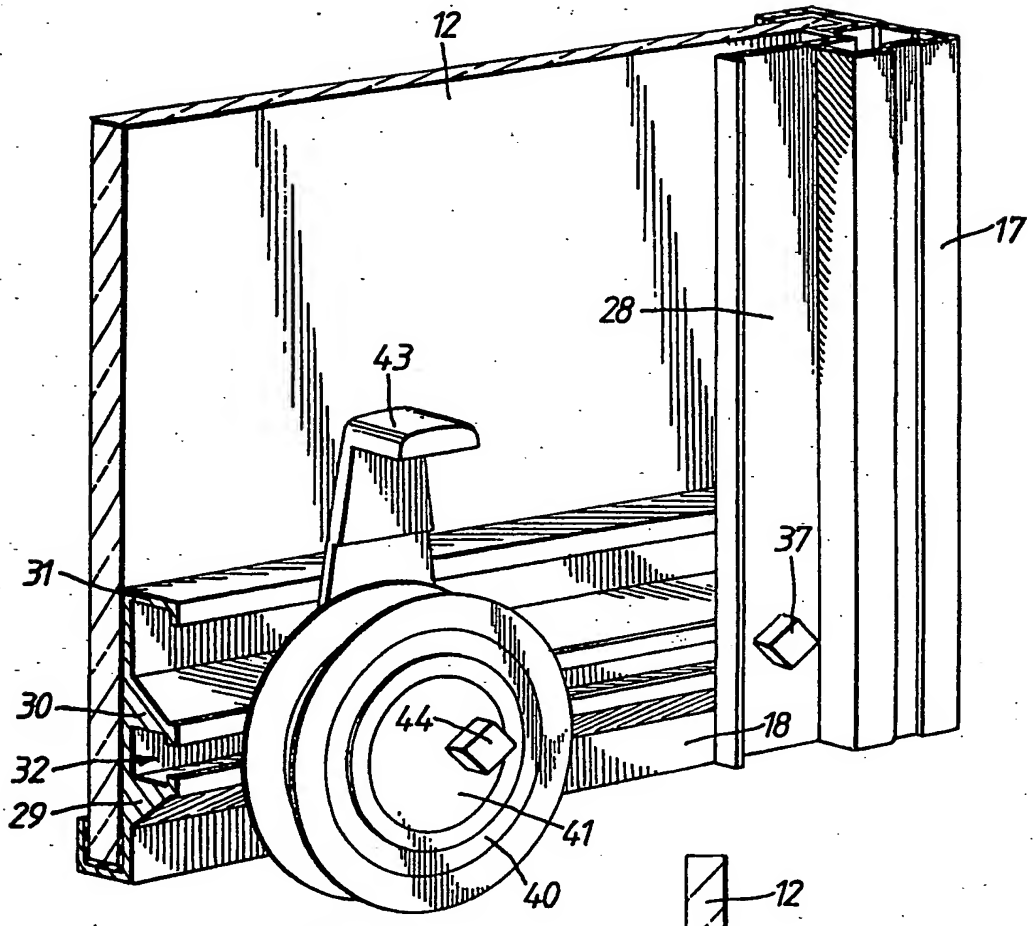
12
17
28
43
37
31
30
44
18
32
29
41
40

FIG.6.

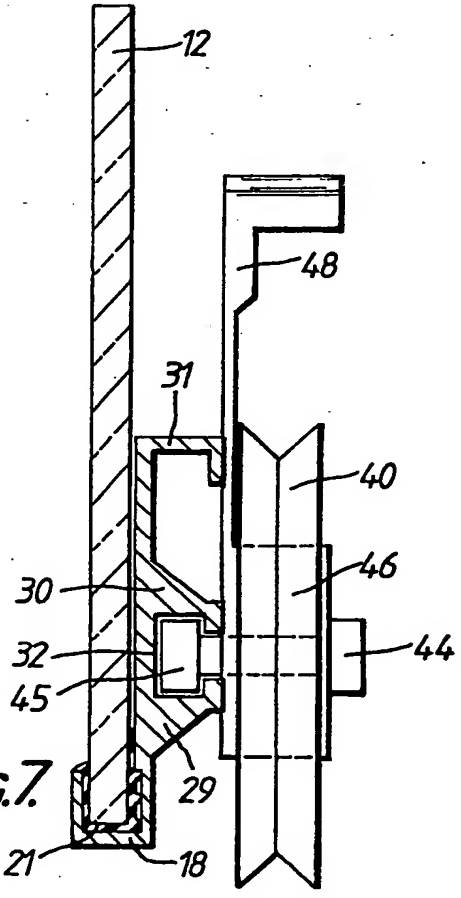
12
48
31
40
46
30
44
32
45
29
21
18

FIG.7.

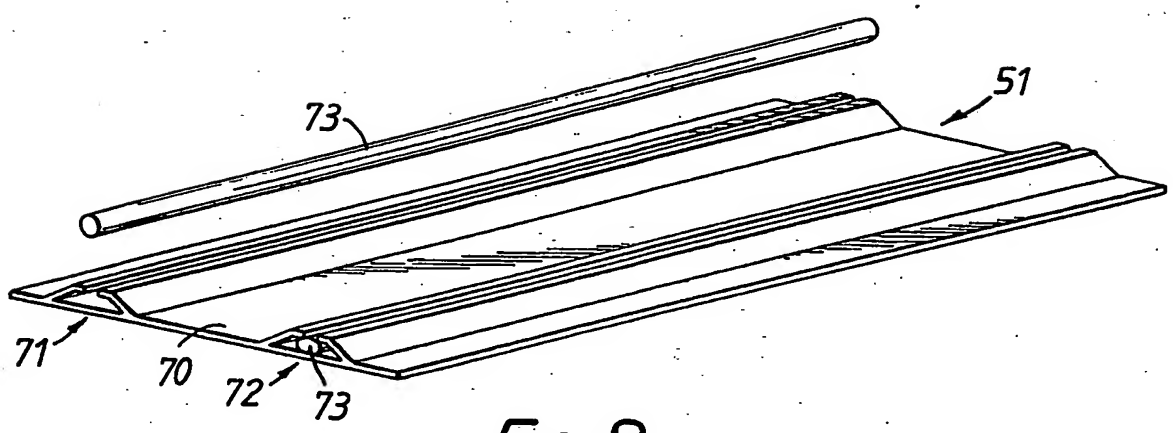

FIG. 8.

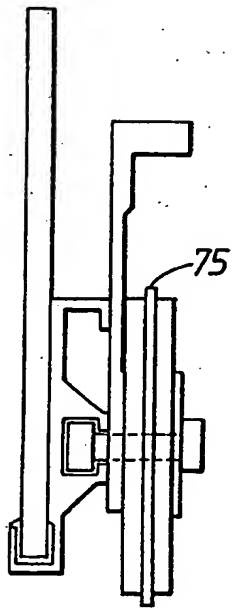

FIG. 9.

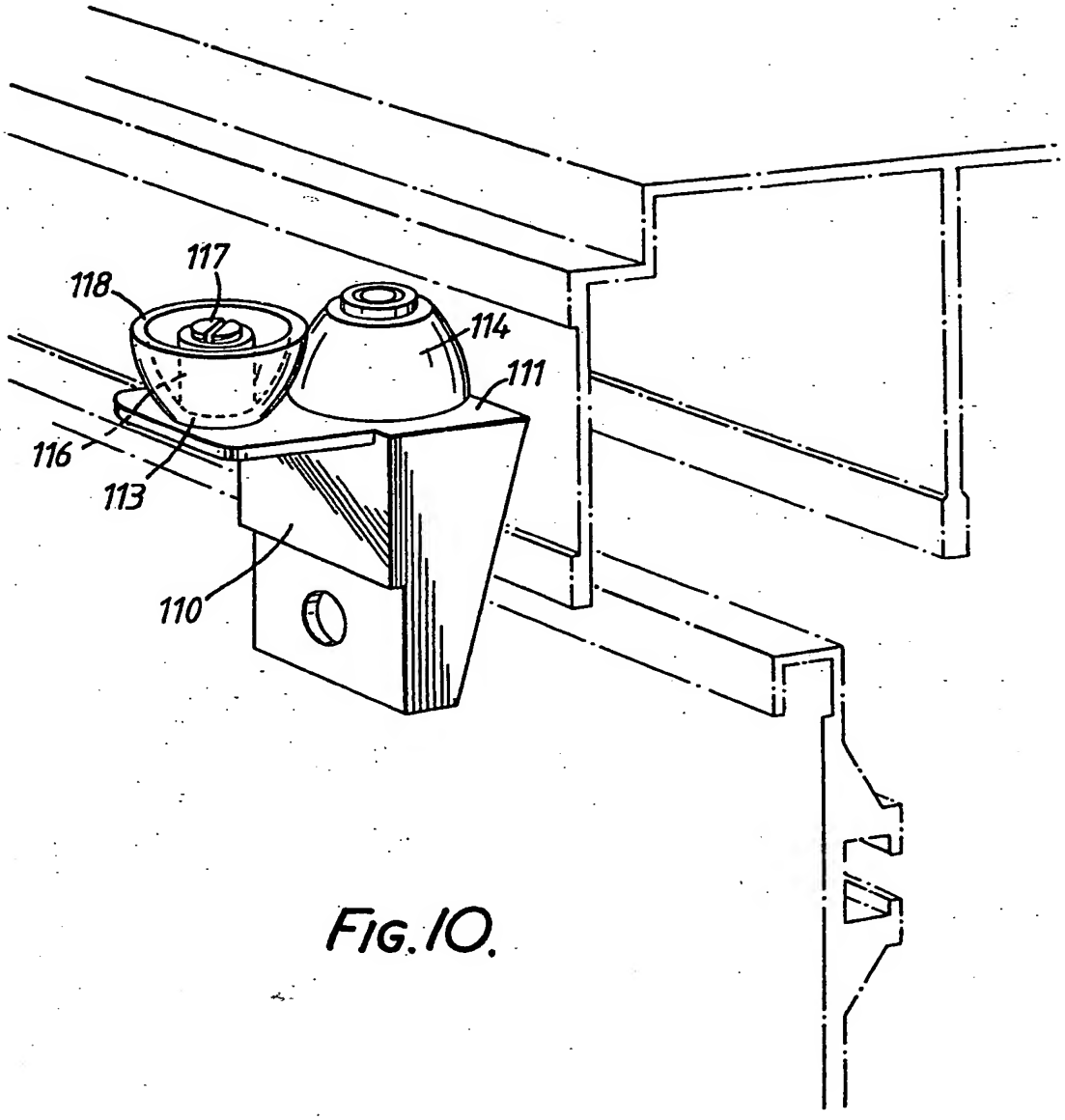

FIG. 10.

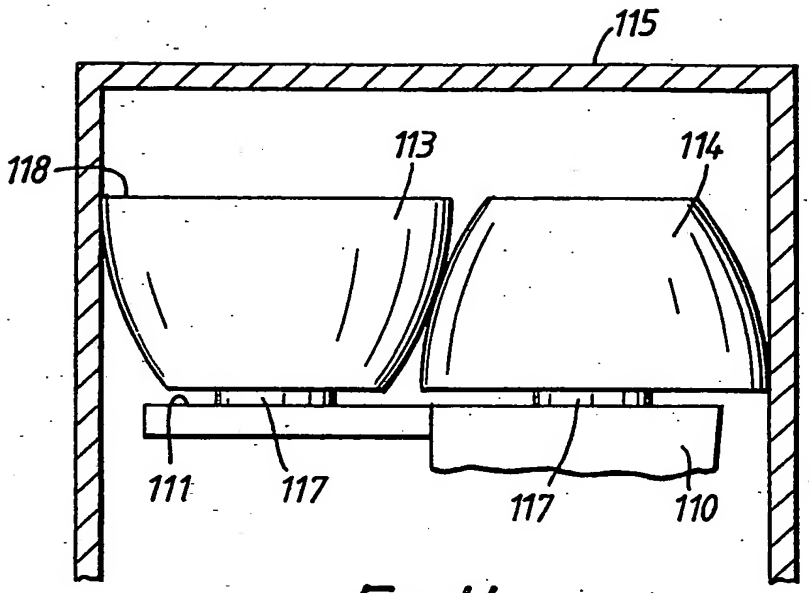

FIG. 11.

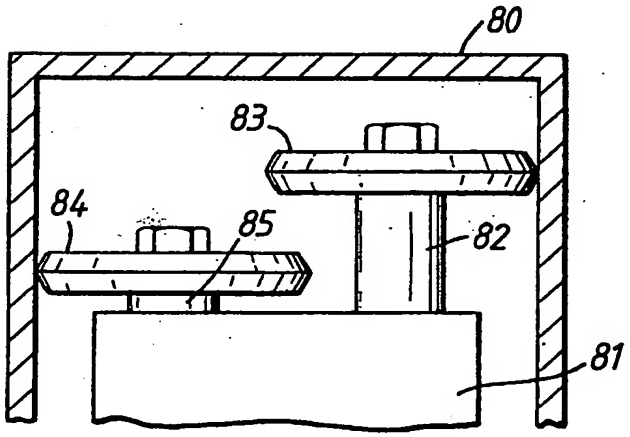

FIG. 12.

SPECIFICATION

Improvements in and relating to sliding doors

This invention is concerned with improvements in and relating to sliding doors and particularly to such doors as ar commonly used to close off wardrobes, wall cupboards and the like.

Sliding doors are extensively used in wardrobes, wall cupboards and the like because of their space saving features, yet in many applications the door size required is non-standard and the door must then be tailor made from simple stock parts. When fitted, however, the user demands a smooth positive movement, which is neither "sloppy" nor "sticky".

It is an object of the present invention to provide an improved sliding door that is simple to assemble but yet has a smooth movement.

The present invention is a slider for guiding in a channel the top of a sliding door and comprising cheeks spaced apart in a first direction and interconnected by a first rib and a web, a tongue extending in a second direction between the cheeks and flexible about an axis extending in the first direction between the cheeks and a second rib parallel with the first and located at the free end of the tongue beyond the cheeks, the ribs being spaced apart in the second direction by a distance greater than the maximum dimension of the cheeks in the second direction.

The present invention is also a sliding door comprising a panel having top and bottom rails secured thereto, the top rail having secured thereto at least one slider as defined in the last preceding paragraph and the bottom rail having spaced wheels secured thereto.

The present invention is further a wheel assembly for use on a sliding door comprising a hub, a wheel rotatable on the hub and a hole passing eccentrically through the hub parallel to the hub axis whereby the assembly may be secured to the door through the hole and rotation of the hub relative to the hole adjusts the height of the wheel relative to the hole and thus the door.

An embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:—

Fig. 1 is a rear perspective view, partly broken away, showing the location of sliders within a top channel extrusion and their mounting on two sliding doors;

Fig. 2 is a front perspective view of a corner of a door as shown in Fig. 1;

Fig. 3 is a rear perspective view of a corner of a door as shown in Fig. 1;

Fig. 4 is a perspective view of a bottom track extrusion;

Fig. 5 is an exploded perspective view showing the fitting of an infill pan l to a stile;

Fig. 6 is a perspective view of part of the bottom door extrusion showing a wheel mounted on the extrusion;

Fig. 7 is a cross section through the wheel of Fig. 6;

Fig. 8 is a modified bottom wheel track;

Fig. 9 is a modified wheel for use with the track of Fig. 8;

Fig. 10 is a perspective view of a modified slider;

Fig. 11 is an end view of the slider of Fig. 10; and

Fig. 12 is an end view of another embodiment of a slider having wheels extending beyond the faces of the door for engaging the walls of a top channel.

Referring now to the drawings, two sliding doors 10 and 11, typically mounted at the front of a cupboard or wardrobe space, each comprises an infill panel 12 within an external frame comprising a top rail 15, side stiles 16 and 17 and a bottom rail 18. The rails and stiles are aluminium extrusions and the infill panel, which in this embodiment is a mirror but could be a wooden or other decorative panel, is secured in grooves in the rails and stiles.

Considering Fig. 5 the stile 16 is provided at its front with a channel 20 which runs the length of the stile and which receives a gasket 21 in which is located the edge of the panel 12. The gasket 21 is substantially U-shaped in cross section having a base 22 which engages the edge surface of the panel 12, a first limb 23 which engages the front of the panel 12 and a second limb 24 which engages the rear of the panel. The first limb of the gasket is thinner than the second limb to reduce its visibility when the door is viewed from the front, and this effect is enhanced by a thin extrusion lip 26 at the front of the channel 20 which serves further t conceal the gasket and thus improve the appearance of the door. The stile 17 (Fig. 6), and the top and bottom rails have similar channels embracing similar gaskets and the respective edges of the panel 12.

The stiles 16 and 17 are mirror images of each other and have inwardly extending flanges 28 which overlie three rearwardly projecting longitudinal walls 29, 30 and 31 on each of the top and bottom rails 15 and 18, the rails also being mirror images of each other. Two of these walls, 29 and 30, are near the centre of the rails and define a channel 32 partially closed at its open side by flanges 33 and 34 at the top of the walls 29 and 30. The external appearance of the stiles may be modified as desired, and in particular may incorporate a finger grip.

The top rail 15 is secured to each of the two stiles by means of a bolt 36 which passes through the flange 28 (Fig. 3) on the stile and between the flanges 33 and 34 and engages a nut (not illustrat d) which is trapped in the channel 32 by the flanges 33 and 34. When the bolt 36 is tightened the stile is firmly secured to the top rail, the flange 28 lying across and engaging the top of all three walls 29, 30 and 31.

In the same manner the bottom rail 18 is secured to each of the stiles 16 and 17 by a bolt 37 (Fig. 6).

Each of the doors 10 and 11 is supported by wheels 40 secured to the bottom rail 18 and is guided at the top by sliders 41 secured to the top rail 15 and engaging the sides of one of the two parallel channels in a channel member 42 of substantially E-shaped cross section. The channel member 42 is of course secured at the top of the opening to be closed by the doors and is also an extruded aluminium section.

As seen best in Fig. 7, ach wheel 40 rotates on a boss 46 which is formed integrally with a lever 48. An eccentric hole in the boss receives a bolt 44 which engages a nut 45 in the channel 32 in the bottom rail 18. It can be se n that by moving th lever 48 the boss 46 is rotated about the bolt 44 to rais or lower the wheel relative to th do r and thus adjust the door mounting. This adjustment is of course made before the bolt 44 is fully tightened.

The wheel 40, being made of metal such as steel or a hard plastics material, such as nylon, has a relatively hard surface and runs on a rubber rail 50 secured to a bottom track extrusion 51 which in turn is fastened across the bottom of the opening to be closed by the doors. As the periphery of the wheel is grooved and the track 50 has a triangular cross section, the wheels are self aligning on the track. It should also be noted that in the closed position of the doors, i.e. the normal position, the weight of the door will tend to cause the wheels to deform the track and create a depression which serves in time t locate the doors in the closed position.

As seen best in Fig. 1 the sliders 41 are connected to the top rail of the respective door by means of a bolt 55 cooperating with a nut located in the channel 32. Each slider 41 comprises two cheeks 56 interconnected by a web 57 through which passes the bolt 55, and a rib 59 located at the rearmost point of the cheeks 56. The rearwardly facing surfaces of the cheeks 56 are inclined to reach a peak where the rib 59 is mounted. The top edge of the web 57 forms the pivot axis for a tongue 60 which projects forwardly from the axis and terminates in front of the surface of the door in a rib 61.

In use, as can be seen in Fig. 1, the rib 59 engages the rear surface of the channel in which the slider moves while the rib 61 engages the front surface of the channel. Because the rib 61 is mounted on the flexible tongue 60 which is forced upwardly as the slider is located in the channel, the rib 61 is biased against the surface of the channel to ensure that both ribs remain in contact with the channel thus preventing any transverse movement of "sloppiness" of the top of the door.

The doors are mounted (rear door first) by inclining the door at a shallow angle, i.e. less than about 15°, and inserting the sliders upwardly into the channel with the rib 61 uppermost. This shallow angle does not cause the cheeks 56 to foul the sides of the channel because the rib 59 is provided at the rearward peak of the cheeks and because the rib 61 is located in front of the front edge of the cheeks. Thus for shallow angles the horizontal spacing of the ribs exceeds the horizontal spacing of the cheek extremities.

When the sliders have been inserted into the channels to a position above their normal operating position the door is moved to the vertical position thus causing the tongue to flex upwardly as the rib 61 engages the front surface of the channel. The door is then mov d down so that the wheels engage the rubber rail.

The maximum angle of inclination of the door is of course when the cheeks foul the channel and by proper design of the cheeks this maximum angle is kept less than the angle at which the tongue would suffer damage.

A modified bottom wheel track is shown in Fig. 8. The extrusion 51 is the same comprising a base 70 with the two pairs of flanges defining tracks 71 and 72. Located beneath each pair of flanges is a rubber strip 73 of circular cross section, the spacing of the flanges leaving a gap through which the strip is accessible. In Fig. 9 it can be seen that the wheel has a raised rib 75 at the centre of its peripheral surface. In use the rib 75 penetrates between the gap between the flanges and engages the rubber strip while the peripheral wheel surfaces on either side of the rib run on the flange surfaces above the rubber strip.

A modified slider or guide is shown in Figs. 10 and 11, and comprises a body 110 bolted to the top rail of a door which is as previously described. On the top surface 111 of the body are mounted two generally dome-shaped rotatable members or wheels 113, 114 which overhang the sides of the body 110 so that the lateral spacing (i.e. in a direction at right angles to the direction of movement of the door) of the extremities of the members 113 and 114 is the greatest lateral dimension of the slider. Each of the wheels has a relatively wide rim at one end and a relatively narrow base at the other end. The member 113 has the form of an inverted mushroom, a central stalk or boss 116 being rotatable on a spigot 117 upstanding from the top surface 111 of the body. From the boss a skirt 118 extends upwardly and outwardly to engage one wall of the channel in which the slider moves. The member 114 is identical to the member 113 except that it is mounted the other way up. The members 113 and 114 are made of a hard wearing but resilient material such as a synthetic rubber. In use the members engage the walls of the channel in which the slider moves, the dimension between the lateral extremities of the members when unstressed being greater than the nominal width of the channel to ensure that the skirts are deformed by the channel to allow the skirts to compensate for variations in the channel width and remove slackness from the slider movement. The wheel 113 with the larger rim at the top is at the front face of the door and the inverted wheel 114 is at the rear face to best fit the tilt of the door as the top is inserted into the channel.

The spacing between the members 113 and 114 is such that deformation of the skirts causes the skirts to touch each other, and thus effectively stiffen the skirts, before the lateral overhang of the skirts is reduced to zero, thus protecting the body against contact with the sides of the channel. Portions of the wheels touch each other before the maximum span of the wheels is squeezed to less than the width of the body. This mutual support helps centre the guide in the channel and protect the body in the ev nt the channel is a tight fit.

As in the slider embodiment previously described it should be noted that the body has its maximum width at the region of the slider contact with the sides of the channel thus allowing the d ors to be mounted without the body fouling the sides of the

channel.

In a modified embodiment the members are solid rather than like a bowl and are made of a softer deformable polymer such as a soft elastomer or a stiff but resilient foam elastomer.

Fig. 12 illustrates another embodiment of a slider guide for maintaining the top of a sliding door between the walls of a generally U-shaped channel 80. As illustrated in this embodiment a body 81, shown only in a fragmentary schematic view, is attachable to the top of a door (not shown). A relatively taller post 82 is located near the front of the door so that a wheel 83 mounted on the post for rotation about a vertical axis has a rim that engages the inside of the front wall of the U-shaped channel. A second wheel 84 is mounted on a shorter post 85 and has a rim that engages the rear wall of the channel at a lower elevation than the upper wheel 83.

The axes of the two posts are offset so that the rims of the wheels extend beyond the opposite faces of the door for maintaining the top of the door within the channel. Preferably the rim of each of the wheels is resilient to conform to variations in channel width and keep the door from rattling back and forth within the channel. Preferably the rims of the wheels are made of a soft elastomer so as to be resiliently deformable, however, other resilient biasing such as springs may also be employed.

CLAIMS

1. A slider for guiding in a channel the top of a sliding door and comprising cheeks spaced apart in a first direction and interconnected by a first rib and a web, a tongue extending in a second direction between the cheeks and flexible about an axis extending in the first direction between the cheeks and a second rib parallel with the first and located at the free end of the tongue beyond the cheeks, the ribs being spaced apart in the second direction by a distance greater than the maximum dimension of the cheeks in the second direction.

2. A slider as claimed in claim 1, in which as the tongue flexes the distance between the ribs decreases such that when the distance between the ribs is equal to the maximum dimension of the cheeks in the same direction, flexure of the tongue is not such as to damage the tongue.

3. A slider as claimed in claim 1 or claim 2, in which the first rib extends between peaks on the cheeks.

4. A slider for guiding in a channel the top of a sliding door substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.

5. A slider for guiding in a channel the top of a sliding door and comprising a body adapted to be secured to the top of a sliding door for movement in a first direction, first and second members mounted on or integral with the body and extending beyond the body in a second direction at right angles to the first, the distance between the extemities of the members in the second direction being the greatest dimension of the slider in the second direction, and at least one of said members being rotatable on the body and having a deformable circumference.

6. A slider as claimed in claim 5, in which said members comprise a pair of wheels mounted on the body for rotation about vertical axes spaced apart in the second direction.

7. A slider as claimed in claim 6, in which the rims of the wheels are at different heights above the body.

8. A slider as claimed in claim 6 or claim 7, wherein the rim of each of the wheels is elastically deformable.

9. A slider as claimed in any of claims 6 to 8, wherein the wheels are identical.

10. A slider as claimed in any of claims 6 to 9, in which each of the wheels has a relatively wider rim at one end and a relatively narrower base at the other end, the wider rim of one wheel being at the top and the wider rim of the other wheel being at the bottom.

11. A slider as claimed in claim 10, wherein ach of the wheels is generally dome-shaped, one of the dome-shaped wheels being upright and th other being inverted.

12. A slider as claimed in claim 11, wherein the peripheral face of each of the wheels is convex.

13. A slider as claimed in any of claims 6 to 12, wherein at least one of the wheels is sufficiently deformable that adjacent portions of the wheels touch each other before the maximum span of the wheels is squeezed to less than the width of the body.

14. A slider as claimed in any of claims 6 to 13, wherein each of the wheels is generally cup-shaped with a hollow interior.

15. A sliding door comprising a panel having top and bottom rails secured thereto, the top rail having secured thereto at least one slider as claimed in any preceding claim and the bottom rail having spaced wheels secured thereto.

16. A door as claimed in claim 15, in which the top rail includes a groove which embraces the top edge of the door and an intervening gasket.

17. A door as claimed in claim 16, in which the gasket is U-shaped, one leg of the U being thinner than the other.

18. A door as claimed in any of claims 15 to 17 when dependent on any of claims 1 to 3, in which the top rail has two longitudinal walls with internal flanges at the top thereof defining a partially closed slot and the or each slider has a bolt passing through its web and engaging a nut captured in the slot, the slider being secured thereby to the top rail.

19. A door as claimed in any of claims 15 to 18, in which the bottom rail has two longitudinal walls with internal flanges at the top thereof defining a partially closed slot and the wheels are secured to the bottom rail by bolts passing through an assembly supp rting the wheels and engaging a nut captured in the slot.

20. A door as claimed in any of claims 15 to 19, in which each wheel is rotatable on a hub and the hub is secured to the bottom rail by a bolt which passes eccentrically through the hub, whereby rotation of

the hub n th bolt adjusts the height of the wheel relative to the door.

21. A door as claimed in of claims 15 to 20, in combination with a rubber track on which the wheels m ve.

22. A wheel assembly for use on a sliding door comprising a hub, a whe l rotatable on the hub and a hole passing eccentrically through the hub parallel to the hub axis whereby th assembly may be secured to the door through the hole and rotati n of the hub relative to the hole adjusts the height of the wheel relative t the hol and thus the door.

Printed for Her Majesty's Stationery Office by Courier Press, Leamington Spa, 8/1986. Demand No. 8817356.
Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.